

Pbar Week In Review

December 23, 2005



Brian Drendel
drendel@fnal.gov

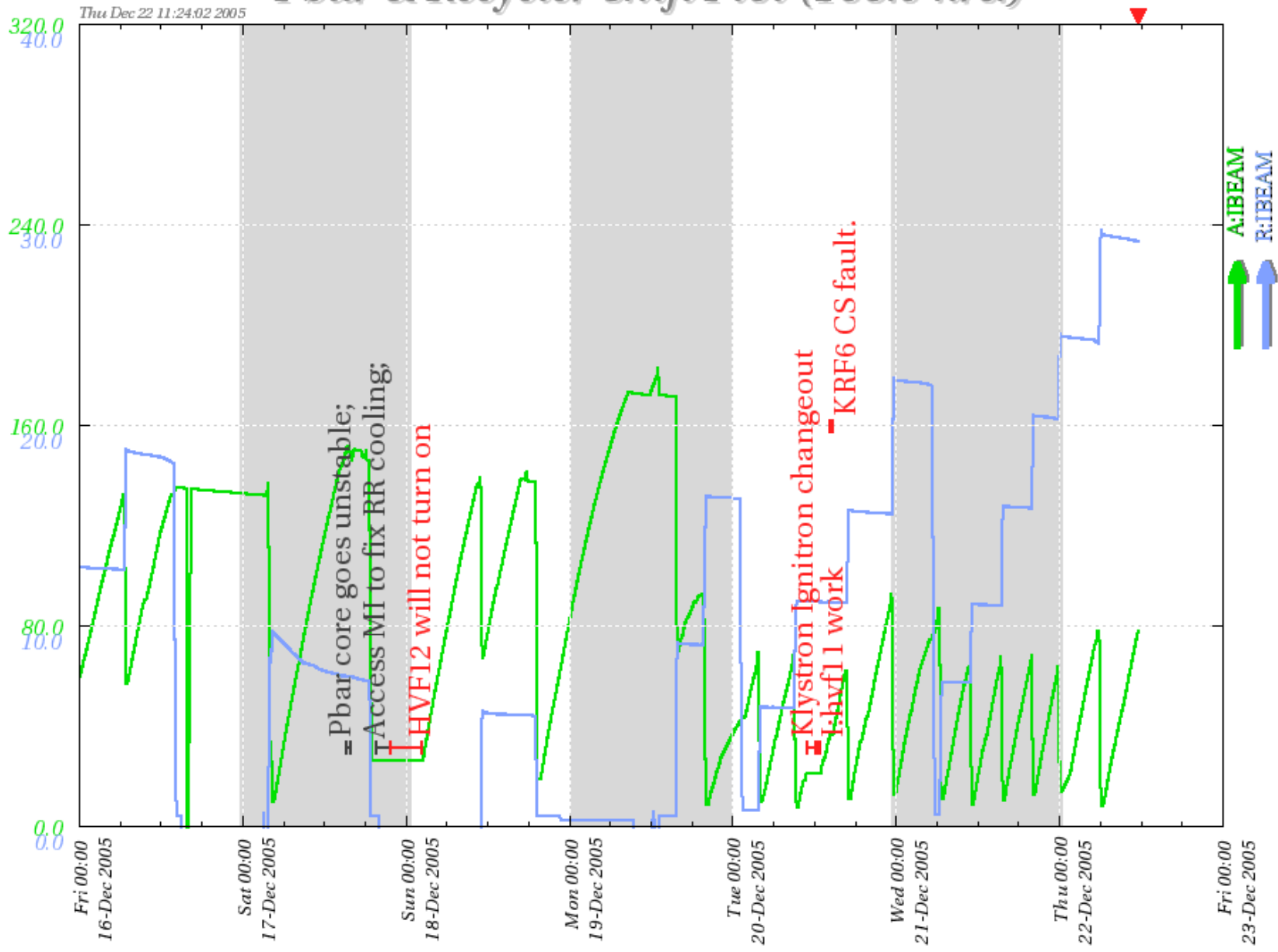


Pbar Week in Review Topics

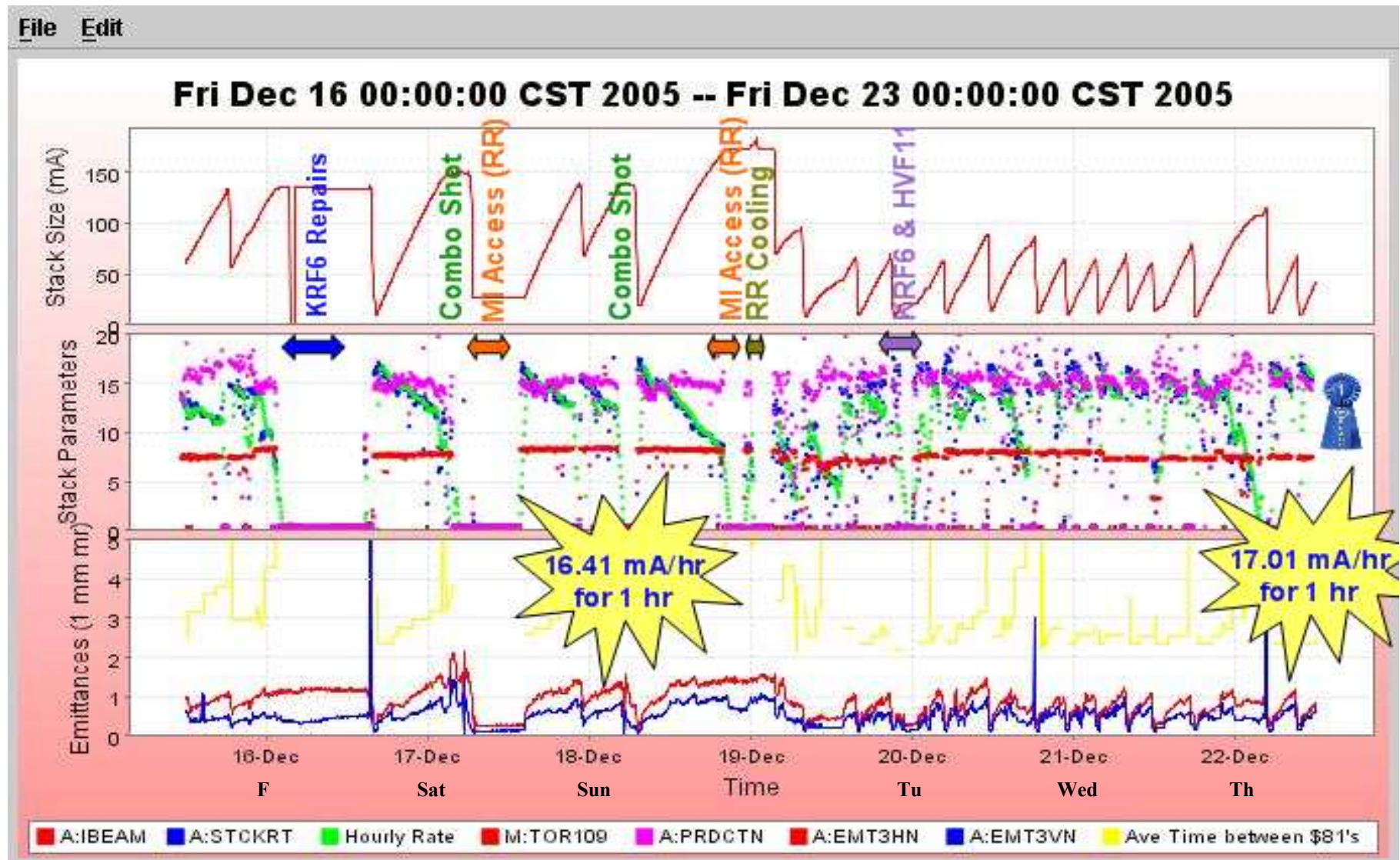


- Current Operations
 - This week's performance
 - Operations Summary
 - Stacking Record
 - Two Combo Shots
 - Shots to Recycler
 - Stacking comparisons
 - Current Conditions versus March 2005
- Dedicated Pbar Studies
 - Overview
 - Operational Changes
 - Target Tune is obsolete
 - Tune stacking from P1 to the Debuncher using BPMs.
 - Future Plans

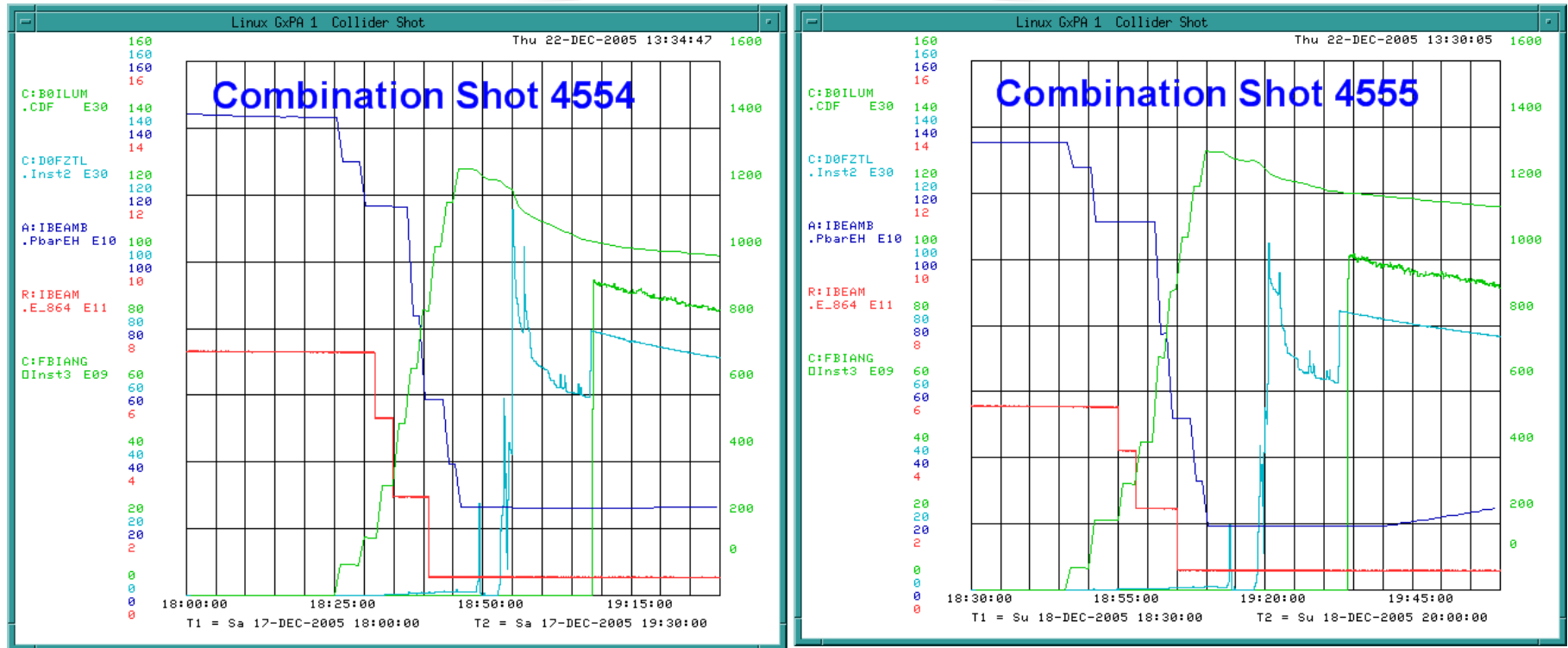
Pbar & Recycler Shift Plot (168.0 hrs.)



Pbar Week in Review - Performance



Combo Shots



- Two Combination Shots

Beam Comparisons



Compare current beam conditions with benchmark stacking conditions of March 2005:

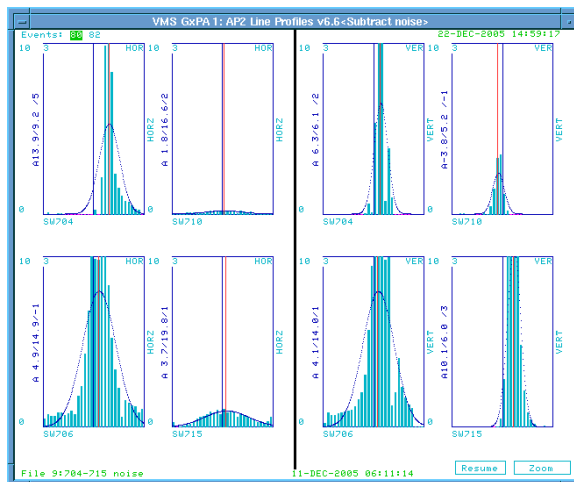
- Beam Intensity on Target vs. Beam Intensity through the AP2 line
- Stack rate vs. Stack Size
- Production Efficiency vs. Stack Size



Beam on Target versus Beam to AP2

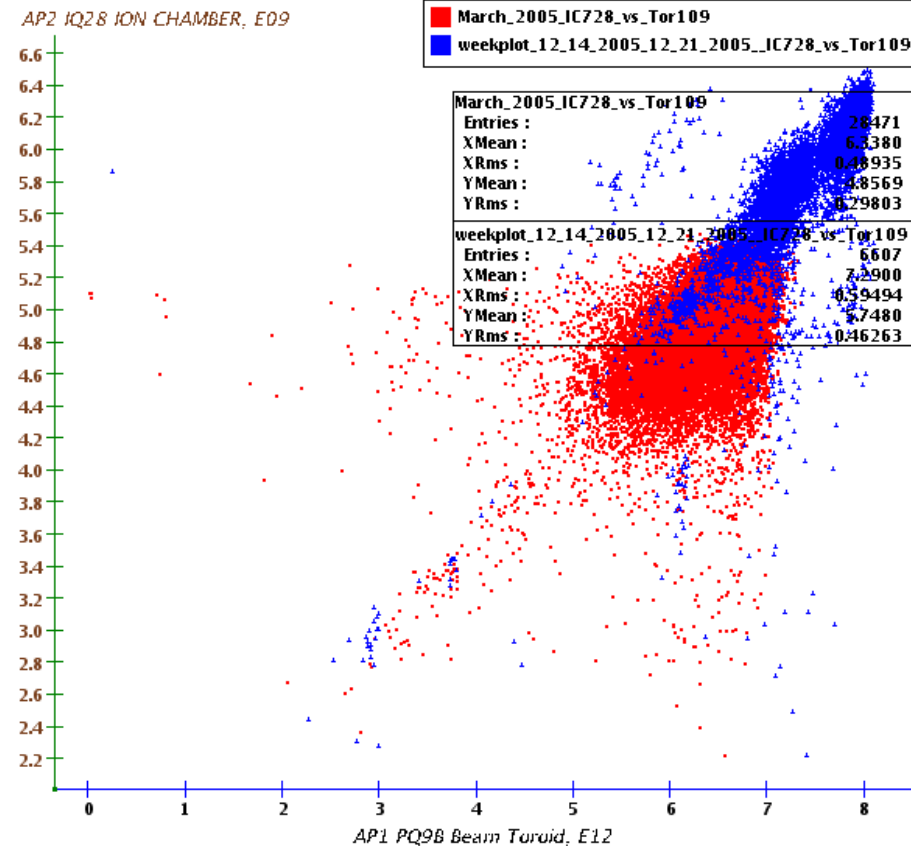


- Compared beam on target versus beam to the end of AP2 between March 2005 and this week
 - Blue Dots = Current Week
 - Red Dots = March 2005
 - More Beam = AP2 SEMs saturate!



23 December 2005

March_2005_IC728_vs_Tor109 - weekplot_12_14_2005_12_21_2005_1...



Pbar status
B. Drendel

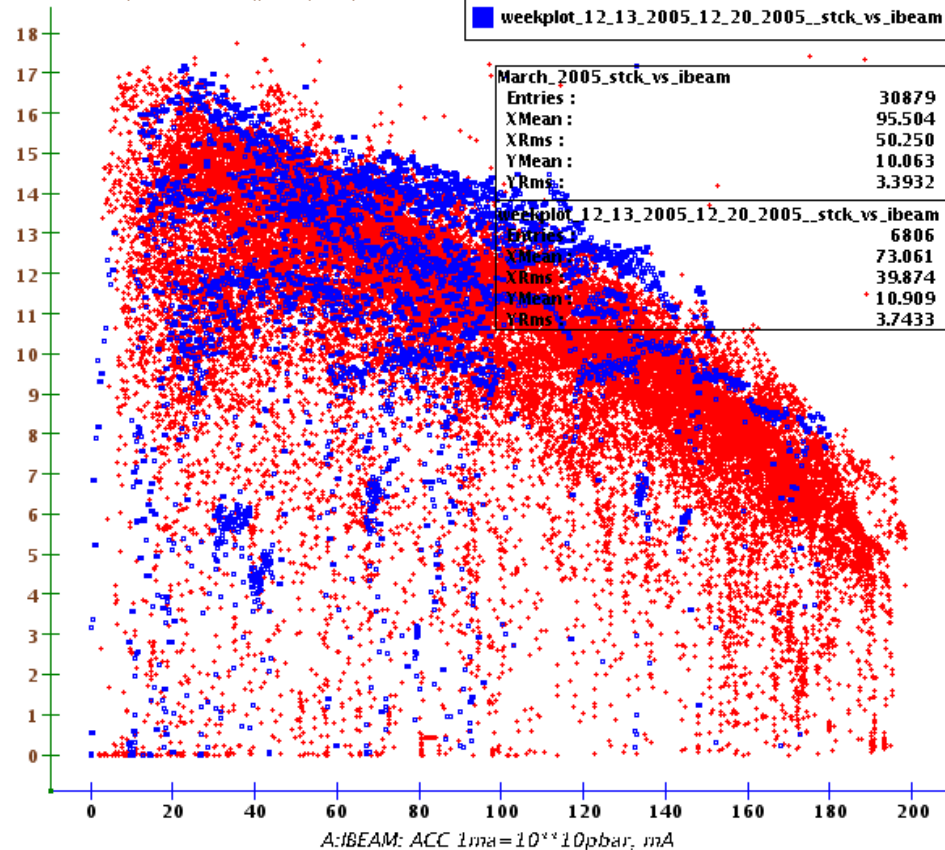
Pbar Week in Review - Stacking



- Compared stack rate versus stack size between March 2005 and this week.
 - Blue Dots = Current Week
 - Red Dots = March 2005

March_2005_stck_vs_ibeam - weekplot_12_13_2005_12_20_2005__stck...

A:STCKRT: pbars stacking rate, mA/h

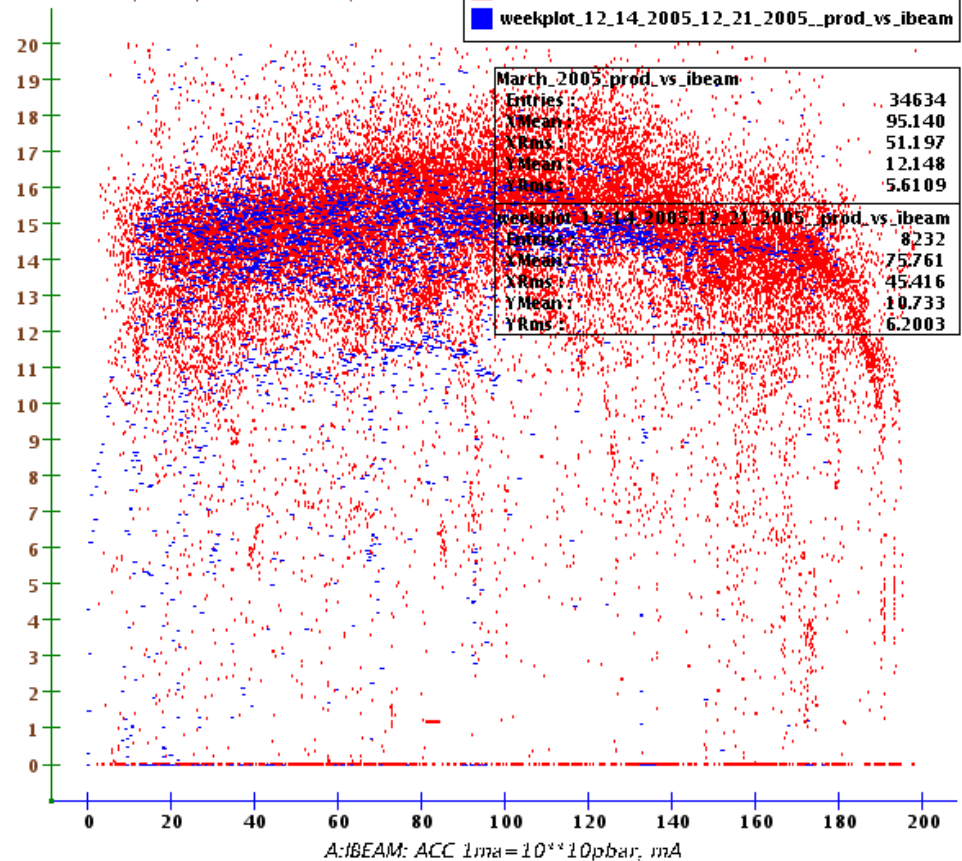


Pbar Week in Review - Stacking

- Compared Pbar Production Efficiency versus stack size between March 2005 and this week.
 - Blue Dots = Current Week
 - Red Dots = March 2005

March_2005_prod_vs_ibeam - weekplot_12_14_2005_12_21_2005__prod...

A:PRDCTN: pbars per P at Tur109, E-6



Pbar Dedicated Studies



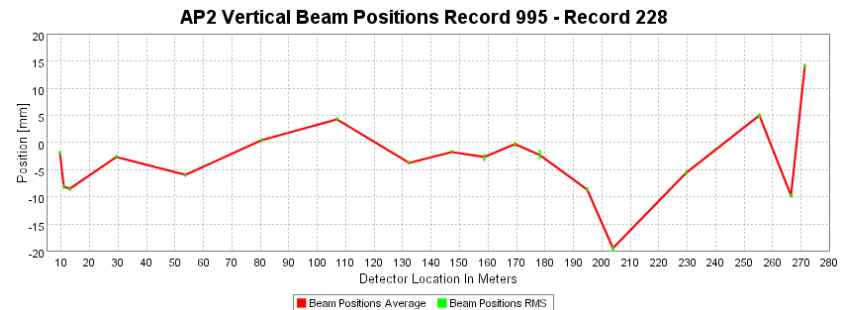
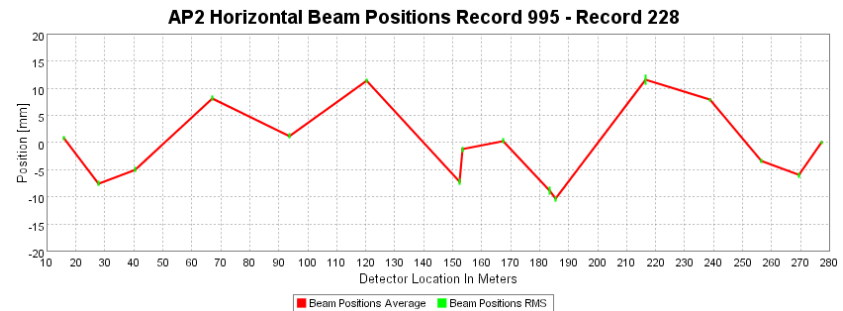
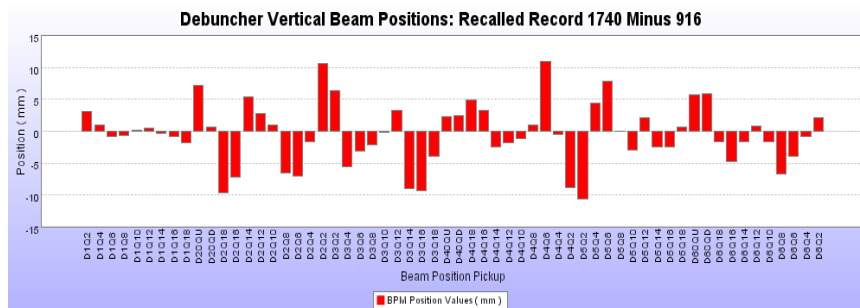
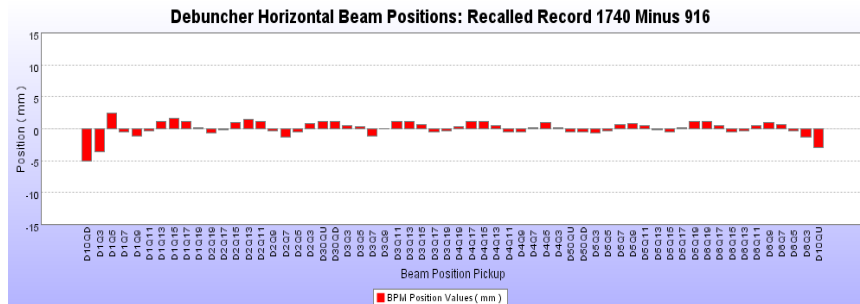
- By the Numbers
- Debuncher and AP2 orbits
- Accomplishments
- Resulting Operational Changes
 - Target Tune is Obsolete
 - P1 to AP2 tuning now is done using BPMs
- Schedule for Future Studies

Dedicated Pbar Studies



- Length of Time: **Mon Nov 21 to Thu Dec 15**
- Number of Elog shift pages: **72**
- Number of Recorded Debuncher Orbits: **857**
- Number of Recorded AP2 Orbits: **775**
- Number of Commissioned items: **12**
- Number of Major Accomplishments: **6+ $\frac{1}{2}$ + $\frac{1}{2}$**
- Number of Confusions (at the time): **∞**
- Number of Major Confusions Existing: **2**
- Number of Short Term Items To Do: **5**
- Number of “Next Time” Known Items: **7 $\frac{1}{2}$**
- Number of Other Things Done: **8+1**

Debuncher and AP2 Orbit Changes



- Changes to Debuncher and AP2 Stacking Orbits

Accomplishments



- Lattice measurements for Debuncher and AP2
- Determine Debuncher Orbit/BPM-Quad offsets
- Corrected Debuncher Vertical Orbit to Quad Centers
- Centered Debuncher Components about orbit
- Determine AP2 Orbit/BPM-Quad offsets
- Set Orbit, Stands and Settings for AP2-Debuncher Injection Region
- Corrected AP2 Orbit to near Quad Centers
- Installed AP2 lattice that matches to Debuncher Lattice

½ done; more yet to do to finish

Documentation



We are in the process of documenting our work

- Setup one-shots for circ beam in Deb
- Setup Deb partial turn beam up AP2
- Setup AP2 extraction of Deb circ beam
- Setup for D/A orbit studies
- Deb Orbit/BPM-Quad offset determination
- Deb Orbit Correction
- Deb Component Centering
- Deb Electrical Centering
- Deb Lattice Measurements
- Setting of the AP2-Deb Injection Region
- AP2 and Deb survey
- Lattice Design
- AP2 Orbit/BPM-Quad offset determination
- AP2 Orbit Correction
- AP2 Lattice Measurements
- Acc Injection region (kicker & septa)
- D/A Beam Based Alignment
- Acc Injection channel and orbit Apertures
- Deb Reverse Proton TBT system
- D/A Kicker time during stacking
- DRF2 timing
- P1-P2-AP1 drift and auto-tune
- AP2 Orbit drift and correction
- Stacking Losses at AP50

Operational Changes



- Major operational change as a result of the dedicated studies

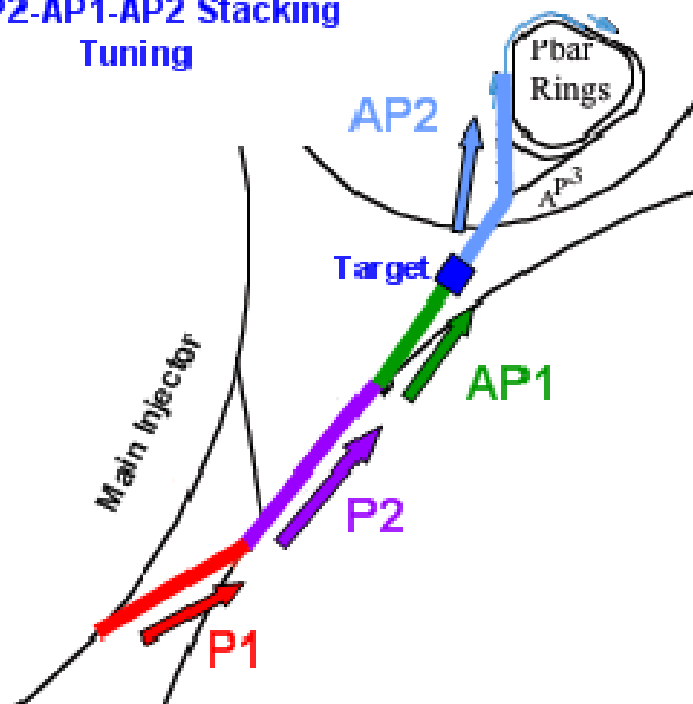


Target Tune is Obsolete



- **Old “target tune”**
 - Assume P1-AP1 ok
 - Maximize intensity to end of AP2 line with M:VT108 and M:HT105.
 - One bump AP2 line for maximum intensity
 - Use trims in the end of the AP2 line to close.
- **Target Tune is now obsolete.**

P1-P2-AP1-AP2 Stacking
Tuning



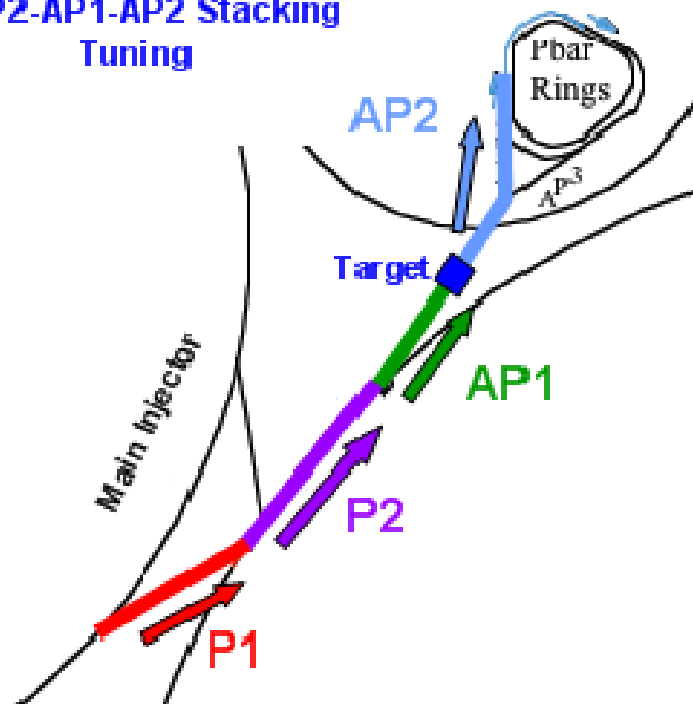
Use BPMs for Beamline Tune-up



- **New Beamline Tune-up**

- Set P1-P2-AP1 BPM orbit using P156 oscillation overthruster to change trims in all three lines
- Set AP2 BPM positions using M:VT108 and M:HT105.

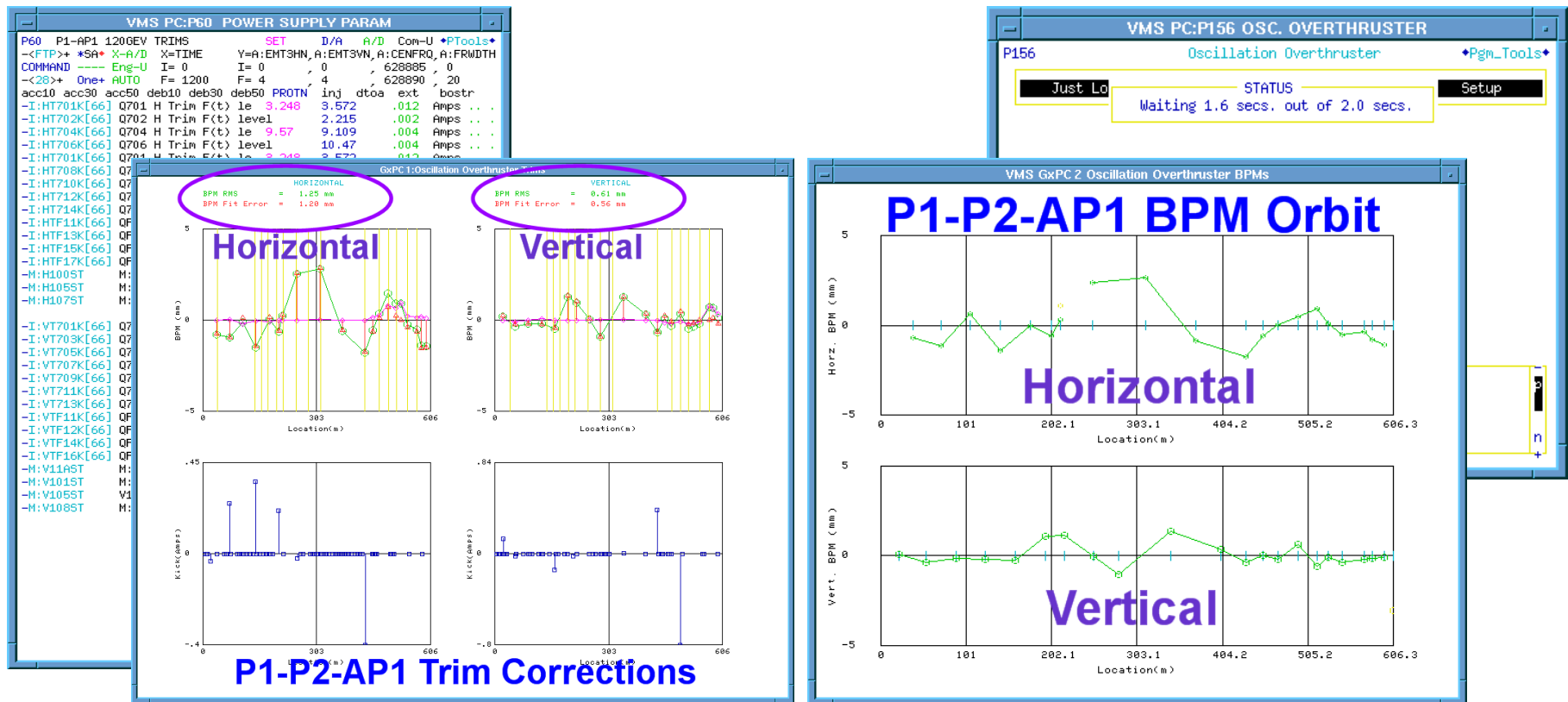
P1-P2-AP1-AP2 Stacking
Tuning



Oscillation Overthruster Application



- P156 takes BPM orbits and calculates trim corrections for the P1-P2-AP1 lines

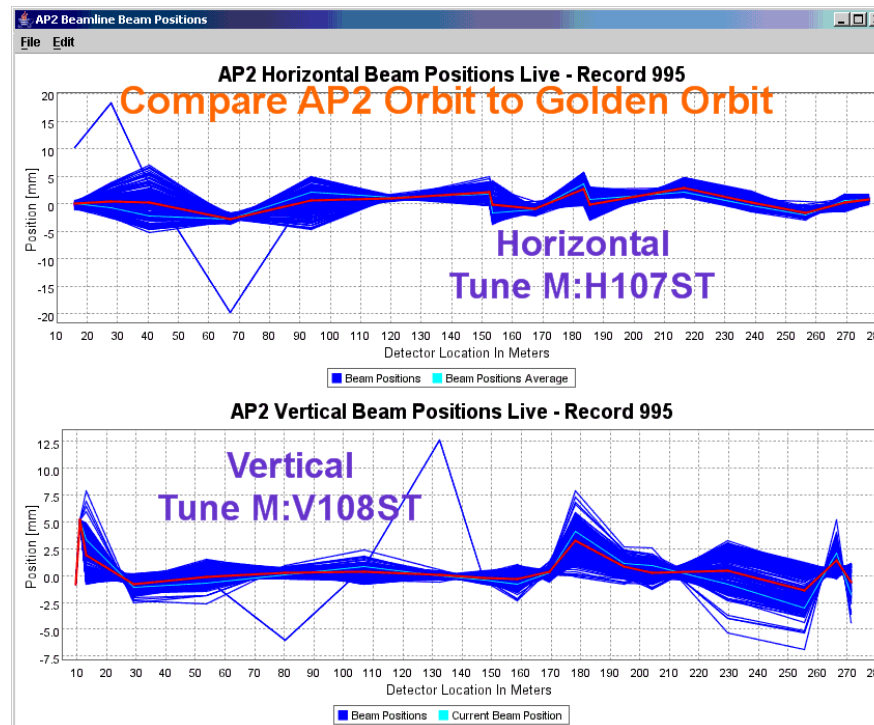


Set AP2 Positions

- Set AP2 positions with HT107 and VT108

VMS PA:P60 POWER SUPPLY PARAM									
P60 KEVIN'S INJ TUNE PAGE	SET	D/A	A/D	Con-U	*PTools				
-<FTP>+ *SA	X=A/D	X=TIME	Y=I:BEAM	A: MT3HN	A:ST KRT	M TOR109			
COMMAND	---	Eng-U	I= 0	I= 0	0	10	0		
-<38>+ s:MI	AUTO	F= 1.5	F= 30	1	20	10			
acc10 acc30 acc50 deb10 deb30 deb50	protn	INJ	dtos	ext	bostr				
ACL> 8'PBAR	TUNING AND MONITOR LEX SA'								
-M:HT107ST	M:HT107 453 Stackin	2.569	1.675	1.672	Amps E.				
-M:V108ST	M:VT108 453 Stackin	-10.71	-9.131	-9.106	Amps E.				
-D:VT723	*1.5 IQ23-VT	25A/25V DIPOLE	-5.325	-5.538	AHP	...			
-D:VT726	*1.5 IQ26 Vert	25A/25V Dipole	-4.65	-4.551	Amp	...			
-D:VT730	*1.5 IQ30 Vert	25A/25V Dipole	-12.64	-12.09	Amp	...			
-D:HT727	*2 IQ27-HT	25A/25V DIPOLE	1.85	2.637	AHP	...			
-D:HT730	*2 IQ30-HT	25A/25V DIPOLE	-4.38	-4.476	AHP	...			
-D:HT731	*2 IQ31-HT	25A/25V DIPOLE	-4.15	-4.113	AHP	...			
! PLEASE TRY AND KEEP IKIK ABOVE 51KV									
-D:IKIKP	D:IKIK F.P. FACTOR	53.95	-15.84	KV					
-D:ISEPV	DEB INJ SEPTUM-04 VOLTGE	707.4	343	VOLT					
A:IBEAR	ACC 1na=10**10pbar		* 84.370649	mA					
A:STAKRT	Pbar Stacking Rate		5.205	mA/h					
Z:PRDTHP	PBAR PER P @ TOR109		15.72	E-6					
A:EMT3HN	Hor 300 MHz Enit/A:IBEAR		.772	pinh					
A:EMT3VN	Ver 300 MHz Enit/A:IBEAR		.388	pinh					
-D:INJFLX	Debuncher Injection	21.2	22.46	McG					
M:TOR109	AP1 PQ98 Beam Toroid		7.134375	E12					
D:IC728	AP2 IQ28 ION CHAMBER		5.714E+00	*E09					
D:IC728N	D:IC728/M:TOR109		.776	E-03					
-D:TBTONT	Deb TBT meas. Count	427	427	DPH					
! -1 TO RESET									
-A:VSARST	VSA #1 Restart Control	13	13	DPH					
-A:VSARVD	Desired Acc Freq Width	12.12	12.12	Hz					
-A:FRMDTH	Accum Freq Width	17.1	16.55	Hz					
-A:CENFRQ	Acc Center	628889.13	628889.32	Hz					
A:STCKAV	Avg time between #81'		7.5862069	Secs					
-A:MARAYD	4-8 Core Mon Array DS	<	>	*-37.94	NA	...			
-D:FLX6BK	Deb Inj Flux BTL Bu	80.72	80.93	* 80.93	Bcks				
-D:FLX6BK	Deb Inj Flux Gap Bu	10.2	9.984	* 9.984	Bcks				
! DO NOT ADJUST									
-D:V730	IBV1	1200A/60V Dip	1159	1152	AHP	...			

23 December 2005



Pbar status
B. Drendel

What's Next?



- Next Two Weeks: Analysis and Write-ups
- Week of January 5th: Review results
- Week of January 9th? Presentations?
- Late January – Early February: Studies Round 2.